WORLDWIDE PDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Oct 22, 2024 – 10:17 AM EDT

PDB ID	:	3PXS
Title	:	Crystal Structure of Diferrous MauG in Complex with Pre-Methylamine Dehydrogenase:
Authors	:	Yukl, E.T.; Goblirsch, B.R.
Deposited on	:	2010-12-10
Resolution	:	2.22 Å(reported)

The following versions of software and data (see references (i)) were used in the production of this report:

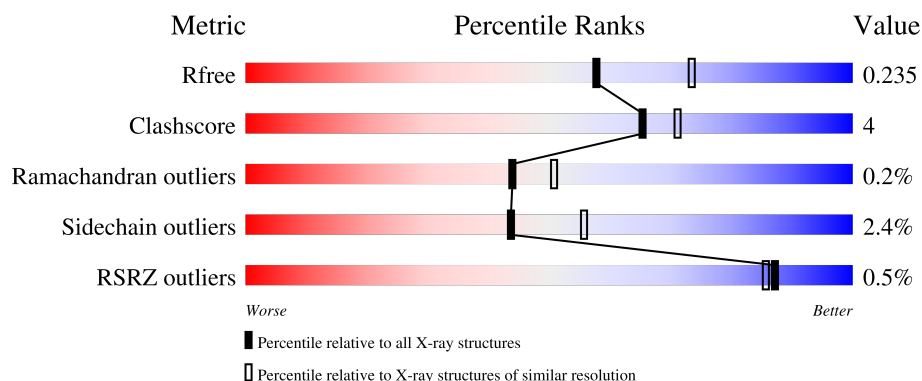|		
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.22 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.

Metric	Percentile Ranks	Value
Rfree		0.235
Clashscore		4
Ramachandran outliers		0.2%
Sidechain outliers		2.4%
RSRZ outliers		0.5%

Worse   *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	164625	7167 (2.24-2.20)
Clashscore	180529	8096 (2.24-2.20)
Ramachandran outliers	177936	8010 (2.24-2.20)
Sidechain outliers	177891	8011 (2.24-2.20)
RSRZ outliers	164620	7166 (2.24-2.20)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	373	88% 7% 5%
1	B	373	86% 9% 5%
2	C	137	81% 9% • 9%
2	E	137	76% 14% • 9%
3	D	386	87% 11% •

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Mol	Chain	Length	Quality of chain
3	F	386	88% 9%

2 Entry composition ⓘ

There are 10 unique types of molecules in this entry. The entry contains 14569 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Methylamine utilization protein MauG.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	354	Total 2740	C 1711	N 491	O 527	S 11	0	1	0
1	B	355	Total 2772	C 1729	N 499	O 533	S 11	0	3	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	368	HIS	-	expression tag	UNP Q51658
A	369	HIS	-	expression tag	UNP Q51658
A	370	HIS	-	expression tag	UNP Q51658
A	371	HIS	-	expression tag	UNP Q51658
A	372	HIS	-	expression tag	UNP Q51658
A	373	HIS	-	expression tag	UNP Q51658
B	368	HIS	-	expression tag	UNP Q51658
B	369	HIS	-	expression tag	UNP Q51658
B	370	HIS	-	expression tag	UNP Q51658
B	371	HIS	-	expression tag	UNP Q51658
B	372	HIS	-	expression tag	UNP Q51658
B	373	HIS	-	expression tag	UNP Q51658

- Molecule 2 is a protein called Methylamine dehydrogenase light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	125	Total 957	C 592	N 161	O 190	S 14	0	1	0
2	E	125	Total 954	C 590	N 161	O 190	S 13	0	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	132	HIS	-	expression tag	UNP P22619
C	133	HIS	-	expression tag	UNP P22619
C	134	HIS	-	expression tag	UNP P22619
C	135	HIS	-	expression tag	UNP P22619
C	136	HIS	-	expression tag	UNP P22619
C	137	HIS	-	expression tag	UNP P22619
E	132	HIS	-	expression tag	UNP P22619
E	133	HIS	-	expression tag	UNP P22619
E	134	HIS	-	expression tag	UNP P22619
E	135	HIS	-	expression tag	UNP P22619
E	136	HIS	-	expression tag	UNP P22619
E	137	HIS	-	expression tag	UNP P22619

- Molecule 3 is a protein called Methylamine dehydrogenase heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	376	Total	C	N	O	S	0	3	0
			2951	1868	508	567	8			
3	F	376	Total	C	N	O	S	0	0	0
			2923	1853	502	560	8			

- Molecule 4 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total	Na	0	0
			2	2		
4	B	2	Total	Na	0	0
			2	2		

- Molecule 5 is HEME C (three-letter code: HEC) (formula: $C_{34}H_{34}FeN_4O_4$).
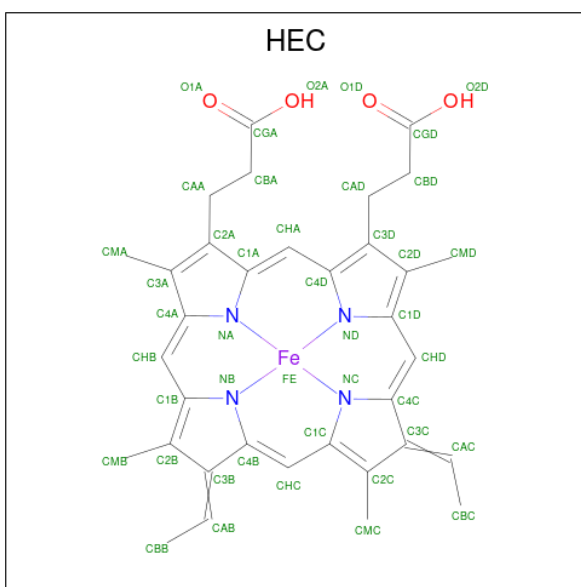
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
5	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
5	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
5	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- Molecule 6 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Ca	0	0
			1	1		
6	B	1	Total	Ca	0	0
			1	1		

- Molecule 7 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	C	1	Total 4	C 2	O 2	0	0
7	D	1	Total 4	C 2	O 2	0	0
7	F	1	Total 4	C 2	O 2	0	0

- Molecule 8 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: $C_8H_{18}O_5$).
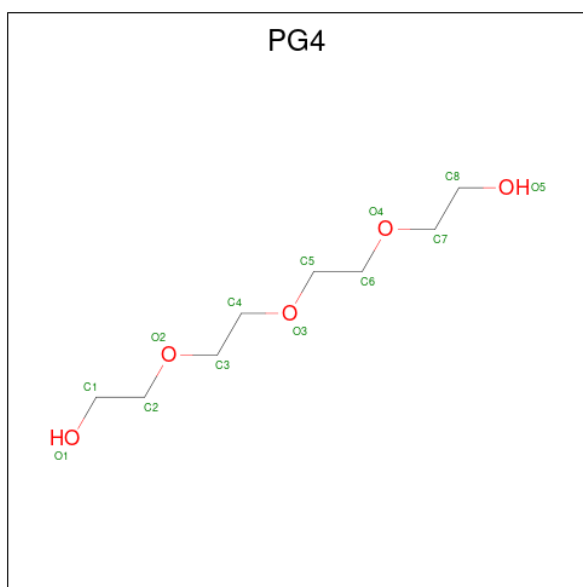
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	F	1	Total 13	C 8	O 5	0	0

- Molecule 9 is 1-(2-METHOXY-ETHOXY)-2-{2-[2-(2-METHOXY-ETHOXY]-ETHOXY}-ETHANE (three-letter code: PG6) (formula: $C_{12}H_{26}O_6$).
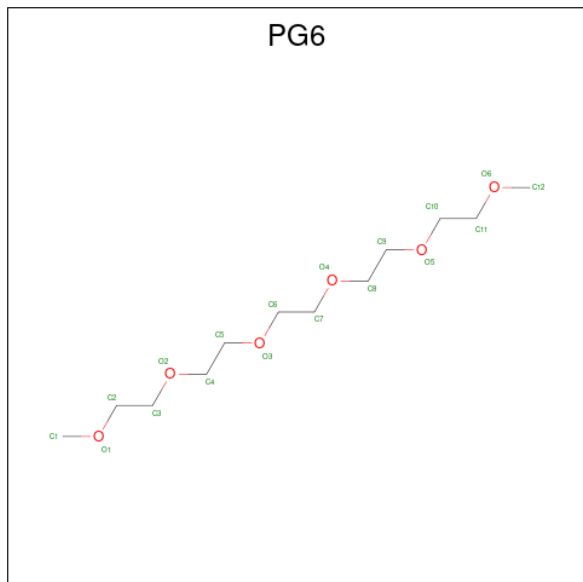
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
9	F	1	Total 18	C 12	O 6	0	0

- Molecule 10 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	202	Total 202	O 202	0	0
10	B	221	Total 221	O 221	0	0
10	C	66	Total 66	O 66	0	0
10	D	214	Total 214	O 214	0	0
10	E	75	Total 75	O 75	0	0
10	F	273	Total 273	O 273	0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.
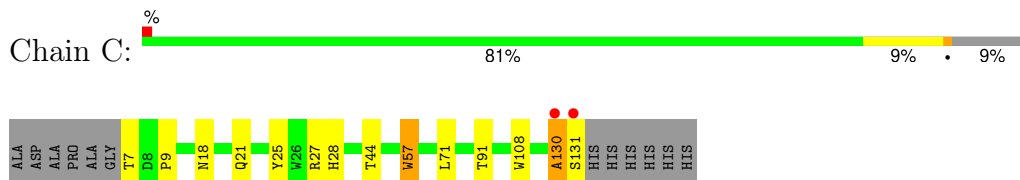
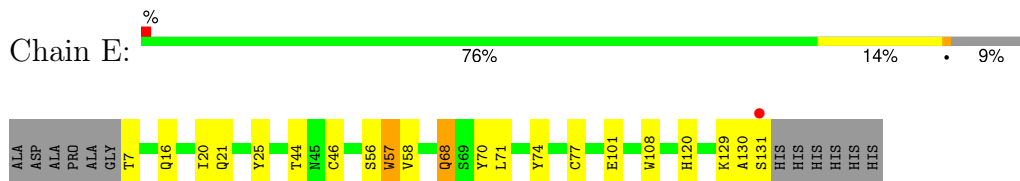• Molecule 1: Methylamine utilization protein MauG
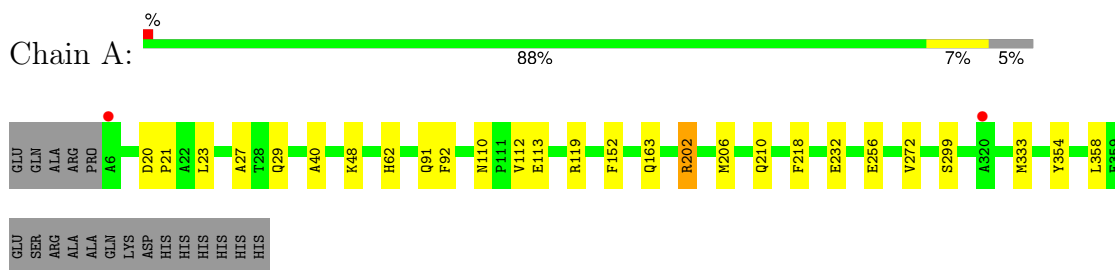
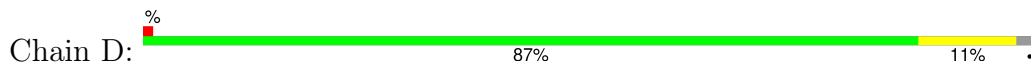

• Molecule 1: Methylamine utilization protein MauG
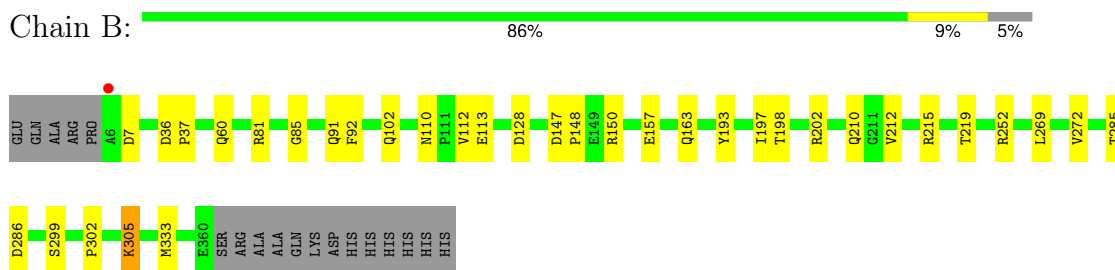
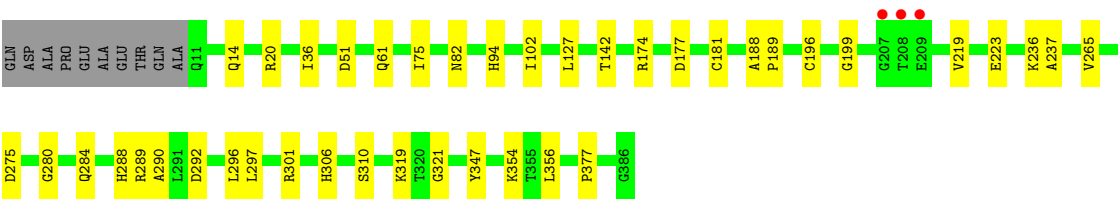• Molecule 2: Methylamine dehydrogenase light chain

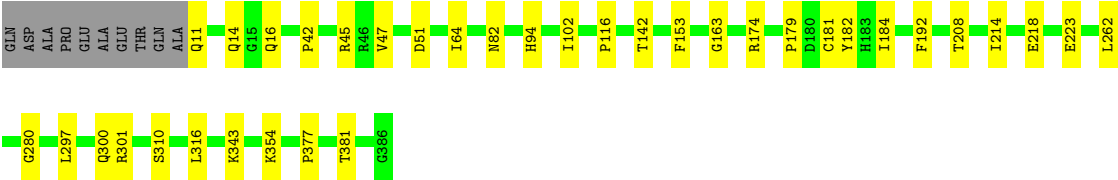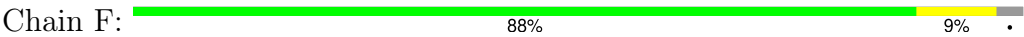• Molecule 2: Methylamine dehydrogenase light chain

• Molecule 3: Methylamine dehydrogenase heavy chain

GLN ASP ALA PRO GLU ALA GLU THR GLN ALA Q11 Q14 R20 I36 D51 Q61 I75 N82 H94 I102 L127 T142 R174 D177 C181 A188 P189 C196 G199 G207 T208 E209 V219 E223 K236 A237 V265

D275 G280 Q284 H288 R289 A290 L291 D292 L296 L297 R301 H306 S310 K319 T320 G321 Y347 K354 T355 L356 P377 G386

• Molecule 3: Methylamine dehydrogenase heavy chain

Chain F:

88%   9%   •

GLN ASP ALA PRO GLU ALA GLU THR GLN ALA Q11 Q14 G15 Q16 P42 R45 R46 V47 D51 I64 N82 H94 I102 P116 T142 F153 G163 R174 P179 D180 C181 Y182 H183 I184 F192 T208 I214 E218 E223 L262

G280 L297 Q300 R301 S310 L316 K343 K354 P377 T381 G386

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	55.53Å 83.52Å 107.78Å 109.94° 91.54° 105.78°	Depositor
Resolution (Å)	44.49 – 2.22 44.49 – 2.22	Depositor EDS
% Data completeness (in resolution range)	96.5 (44.49-2.22) 96.5 (44.49-2.22)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.12 (at 2.22Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.177 , 0.229 0.180 , 0.235	Depositor DCC
R_{free} test set	4161 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	25.1	Xtriage
Anisotropy	0.131	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 26.6	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	14569	wwPDB-VP
Average B, all atoms (Å^2)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.00% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: CA, NA, PG6, 0AF, ACT, PG4, HEC

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$|Z|$>5	RMSZ	#$|Z|$>5
1	A	0.40	0/2807	0.54	0/3809
1	B	0.41	0/2836	0.53	0/3846
2	C	0.40	0/969	0.57	0/1323
2	E	0.42	0/963	0.56	0/1315
3	D	0.40	0/3028	0.53	0/4125
3	F	0.43	0/3000	0.55	0/4088
All	All	0.41	0/13603	0.54	0/18506

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2740	0	2616	17	0
1	B	2772	0	2645	25	0
2	C	957	0	864	14	0
2	E	954	0	859	15	0
3	D	2951	0	2828	22	0
3	F	2923	0	2808	14	0
4	A	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	2	0	0	0	0
5	A	86	0	60	4	0
5	B	86	0	60	3	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
7	C	4	0	3	0	0
7	D	4	0	3	0	0
7	F	4	0	3	0	0
8	F	13	0	18	0	0
9	F	18	0	26	0	0
10	A	202	0	0	1	0
10	B	221	0	0	2	0
10	C	66	0	0	0	0
10	D	214	0	0	1	0
10	E	75	0	0	1	0
10	F	273	0	0	0	0
All	All	14569	0	12793	97	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

The worst 5 of 97 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:57:0AF:HE3	2:C:108:TRP:CD1	1.78	1.19
1:B:215[B]:ARG:HG2	1:B:215[B]:ARG:HH11	0.93	1.07
2:C:57:0AF:CE3	2:C:108:TRP:CD1	2.39	1.05
1:B:215[B]:ARG:HH11	1:B:215[B]:ARG:CG	1.76	0.99
1:B:215[B]:ARG:HG2	1:B:215[B]:ARG:NH1	1.75	0.95

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	353/373 (95%)	343 (97%)	10 (3%)	0	100	100
1	B	356/373 (95%)	347 (98%)	9 (2%)	0	100	100
2	C	123/137 (90%)	121 (98%)	1 (1%)	1 (1%)	16	16
2	E	122/137 (89%)	119 (98%)	3 (2%)	0	100	100
3	D	377/386 (98%)	366 (97%)	10 (3%)	1 (0%)	37	41
3	F	374/386 (97%)	365 (98%)	8 (2%)	1 (0%)	37	41
All	All	1705/1792 (95%)	1661 (97%)	41 (2%)	3 (0%)	44	51

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	C	130	ALA
3	D	102	ILE
3	F	102	ILE

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	277/292 (95%)	272 (98%)	5 (2%)	54	67
1	B	280/292 (96%)	271 (97%)	9 (3%)	34	43
2	C	105/112 (94%)	104 (99%)	1 (1%)	73	83
2	E	104/112 (93%)	100 (96%)	4 (4%)	28	36
3	D	307/311 (99%)	299 (97%)	8 (3%)	41	52
3	F	304/311 (98%)	295 (97%)	9 (3%)	36	46
All	All	1377/1430 (96%)	1341 (97%)	36 (3%)	44	52

5 of 36 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	F	94	HIS
3	F	381	THR
3	F	218	GLU
3	F	300	GLN
1	B	305[A]	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 14 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	91	GLN
1	B	163	GLN
3	F	300	GLN
3	F	14	GLN
3	F	30	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

2 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
2	0AF	E	57	2	13,16,17	2.01	4 (30%)	9,22,24	1.66	2 (22%)
2	0AF	C	57	2	13,16,17	1.75	4 (30%)	9,22,24	1.19	1 (11%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	0AF	E	57	2	-	1/4/6/8	0/2/2/2
2	0AF	C	57	2	-	0/4/6/8	0/2/2/2

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	57	0AF	CZ2-CE2	-4.96	1.35	1.42
2	C	57	0AF	CZ2-CE2	-4.35	1.36	1.42
2	E	57	0AF	CD1-NE1	-2.81	1.30	1.36
2	E	57	0AF	CE3-CD2	-2.70	1.36	1.42
2	C	57	0AF	CE3-CD2	-2.64	1.37	1.42

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	57	0AF	CH2-CZ2-CE2	3.06	123.53	120.11
2	E	57	0AF	CZ3-CH2-CZ2	-2.96	116.77	120.37
2	C	57	0AF	CE3-CD2-CG	-2.92	129.06	134.42

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	E	57	0AF	C-CA-CB-CG

There are no ring outliers.

2 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	57	0AF	3	0
2	C	57	0AF	5	0

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 15 ligands modelled in this entry, 6 are monoatomic - leaving 9 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul

statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
8	PG4	F	387	-	12,12,12	0.51	0	11,11,11	0.23	0
5	HEC	A	500	1	32,50,50	1.64	8 (25%)	30,82,82	2.55	9 (30%)
5	HEC	B	600	1	32,50,50	1.58	8 (25%)	30,82,82	2.89	10 (33%)
7	ACT	C	138	-	3,3,3	0.83	0	3,3,3	1.21	0
9	PG6	F	388	-	17,17,17	0.56	0	16,16,16	0.25	0
7	ACT	F	389	-	3,3,3	0.81	0	3,3,3	1.34	0
7	ACT	D	387	-	3,3,3	0.84	0	3,3,3	1.42	0
5	HEC	A	600	1	32,50,50	1.62	8 (25%)	30,82,82	2.89	11 (36%)
5	HEC	B	500	1	32,50,50	1.58	8 (25%)	30,82,82	2.58	11 (36%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	PG4	F	387	-	-	6/10/10/10	-
5	HEC	A	500	1	-	4/10/54/54	-
5	HEC	B	600	1	-	2/10/54/54	-
9	PG6	F	388	-	-	9/15/15/15	-
5	HEC	A	600	1	-	2/10/54/54	-
5	HEC	B	500	1	-	1/10/54/54	-

The worst 5 of 32 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	500	HEC	C3C-C4C	3.74	1.49	1.43
5	A	600	HEC	C4B-C3B	3.44	1.49	1.43
5	B	500	HEC	C4B-C3B	3.33	1.49	1.43
5	A	600	HEC	C2A-C1A	3.32	1.49	1.42
5	A	500	HEC	C4B-C3B	3.30	1.49	1.43

The worst 5 of 41 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	B	600	HEC	CBB-CAB-C3B	-8.21	108.27	127.49
5	A	500	HEC	CBB-CAB-C3B	-7.76	109.33	127.49
5	B	600	HEC	CBC-CAC-C3C	-7.48	109.99	127.49
5	A	600	HEC	CBC-CAC-C3C	-7.29	110.43	127.49
5	A	600	HEC	CBB-CAB-C3B	-7.14	110.79	127.49

There are no chirality outliers.

5 of 24 torsion outliers are listed below:
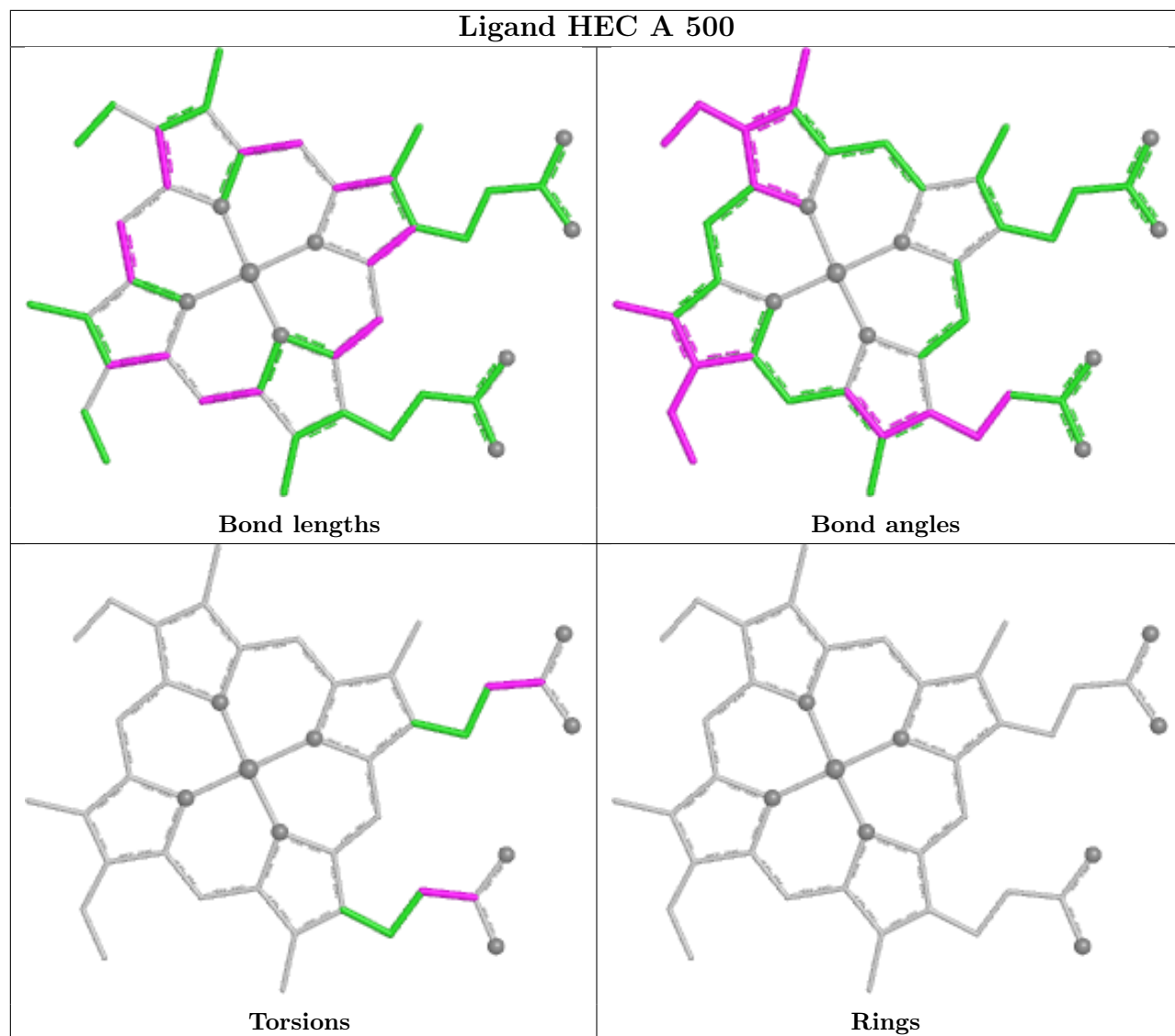
Mol	Chain	Res	Type	Atoms
8	F	387	PG4	O2-C3-C4-O3
9	F	388	PG6	O3-C6-C7-O4
9	F	388	PG6	O4-C8-C9-O5
9	F	388	PG6	C10-C11-O6-C12
8	F	387	PG4	C5-C6-O4-C7

There are no ring outliers.
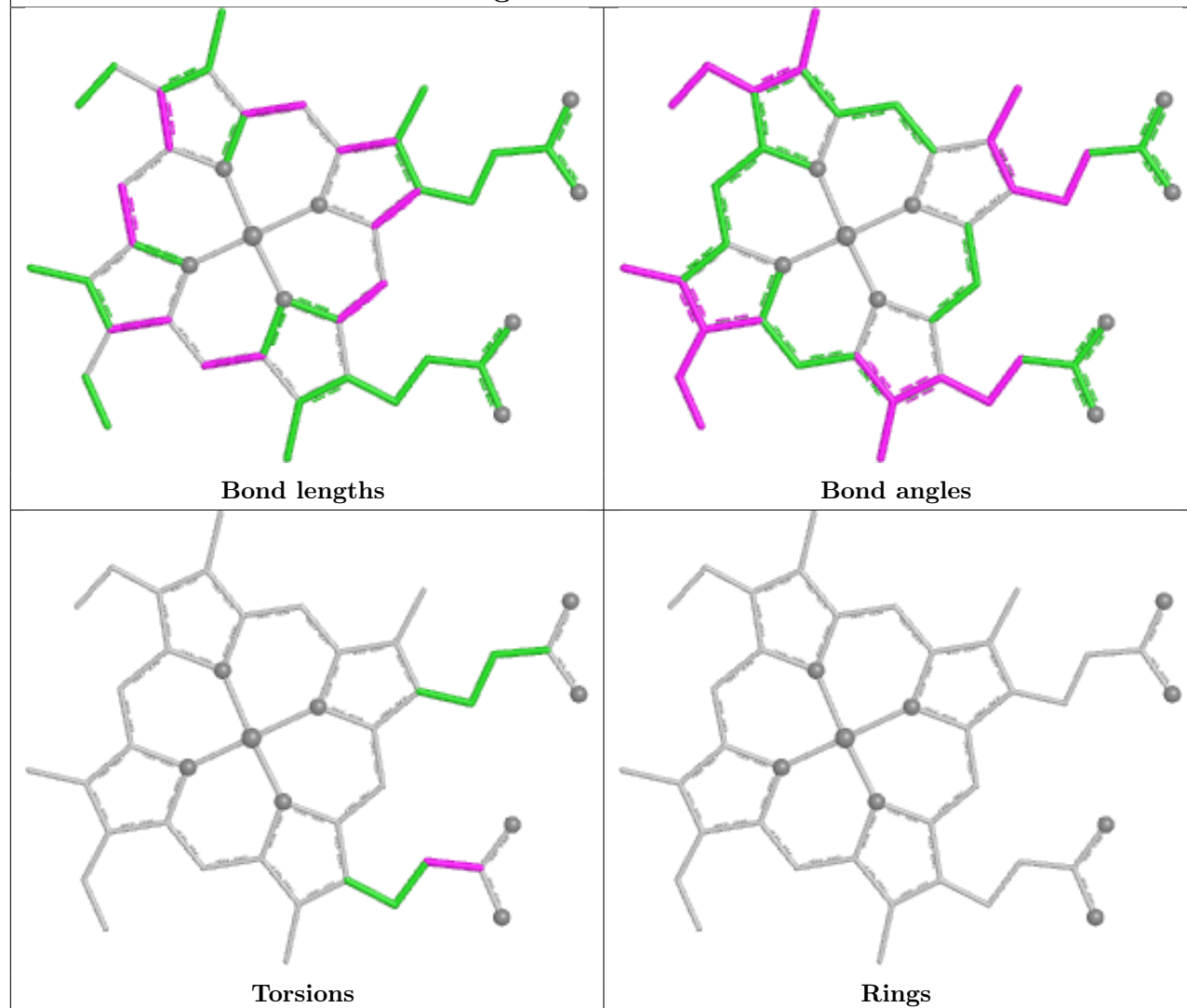
4 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	500	HEC	3	0
5	B	600	HEC	1	0
5	A	600	HEC	1	0
5	B	500	HEC	2	0
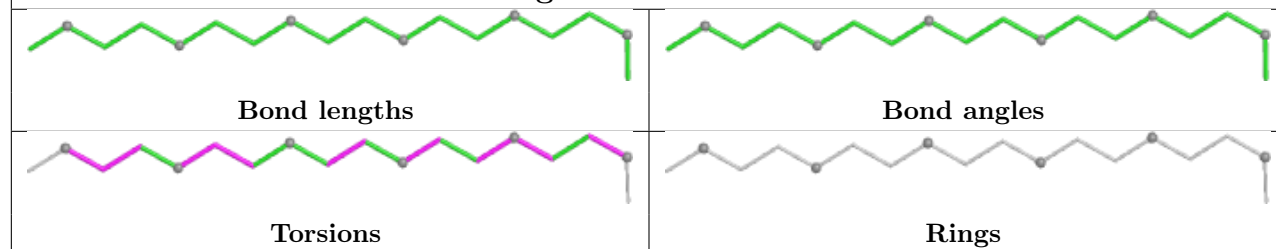
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.
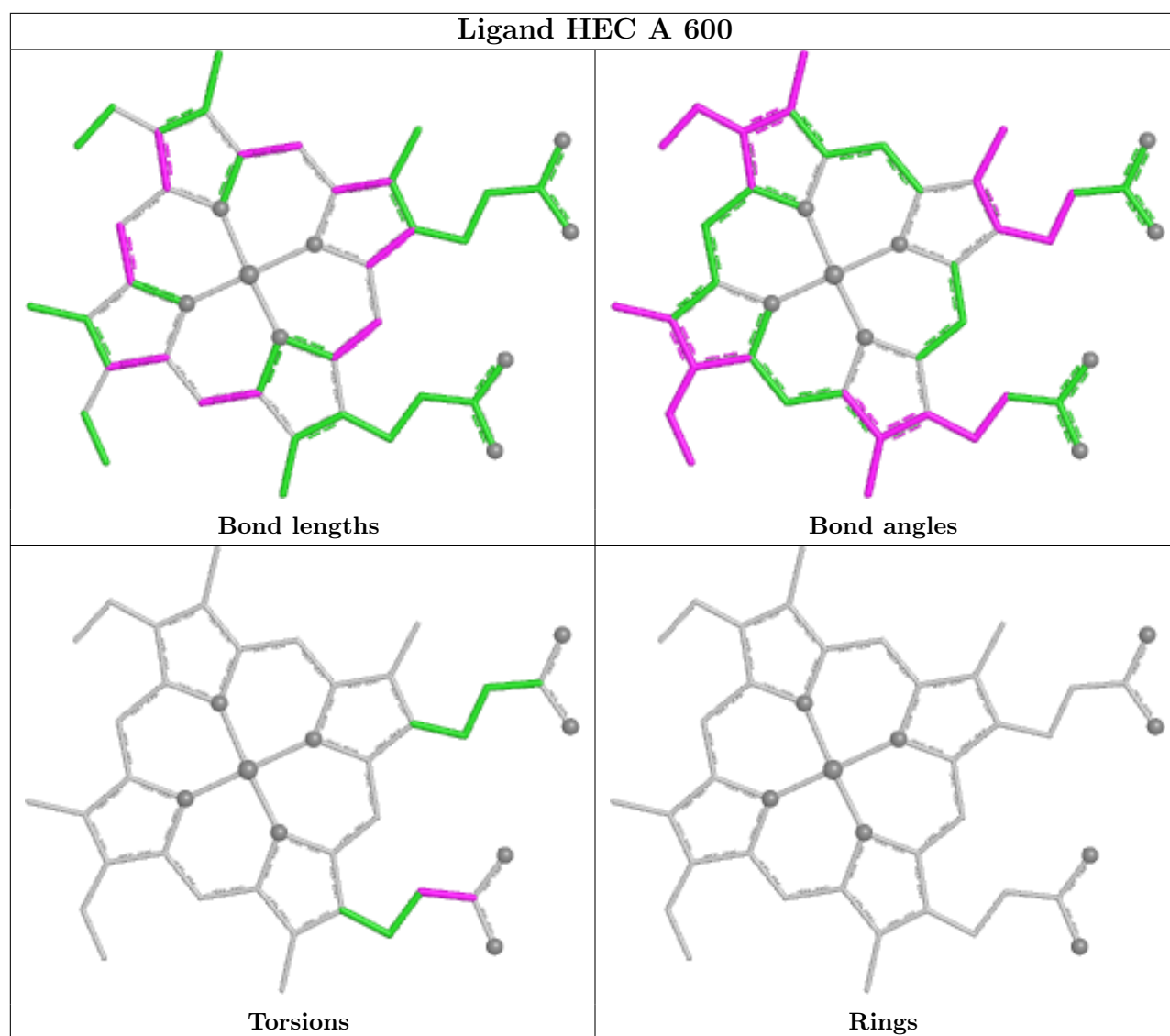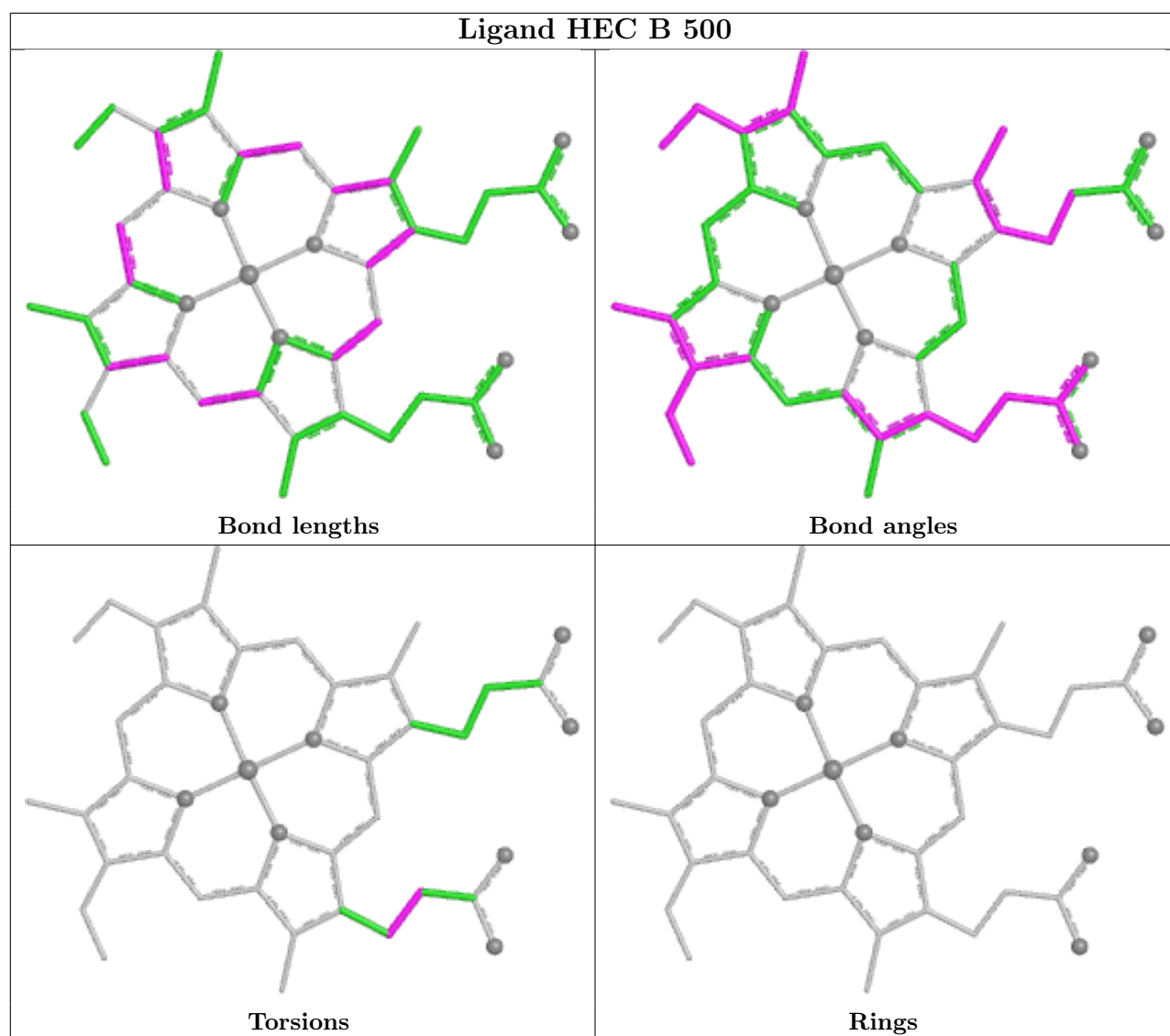
Ligand HEC A 500

Bond lengths

Bond angles

Torsions

Rings

Ligand HEC B 600

Bond lengths

Bond angles

Torsions

Rings

Ligand PG6 F 388

Bond lengths

Bond angles

Torsions

Rings

Ligand HEC A 600

Bond lengths

Bond angles

Torsions

Rings

Ligand HEC B 500

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	354/373 (94%)	-0.36	2 (0%)	85	84	17, 28, 38, 51	1 (0%)
1	B	355/373 (95%)	-0.38	1 (0%)	90	89	15, 28, 40, 53	3 (0%)
2	C	124/137 (90%)	-0.46	2 (1%)	70	68	16, 25, 33, 49	1 (0%)
2	E	124/137 (90%)	-0.48	1 (0%)	82	81	18, 22, 31, 46	0
3	D	376/386 (97%)	-0.33	3 (0%)	82	81	14, 28, 42, 56	3 (0%)
3	F	376/386 (97%)	-0.54	0	100	100	16, 23, 35, 47	0
All	All	1709/1792 (95%)	-0.41	9 (0%)	87	86	14, 26, 40, 56	8 (0%)

The worst 5 of 9 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	D	208	THR	3.5
3	D	207	GLY	2.8
1	B	6	ALA	2.7
2	C	130	ALA	2.7
2	C	131	SER	2.6

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.
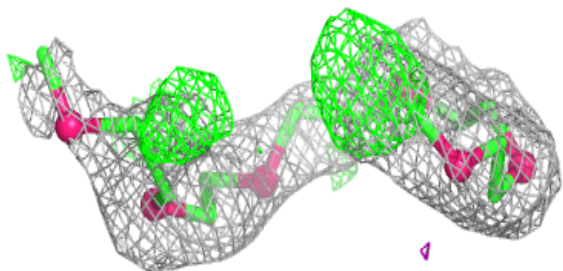
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	0AF	C	57	15/16	0.88	0.11	28,31,34,35	0
2	0AF	E	57	15/16	0.88	0.10	29,31,35,36	0

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($Å^2$)	Q<0.9
9	PG6	F	388	18/18	0.73	0.19	49,55,61,61	0
8	PG4	F	387	13/13	0.77	0.18	65,67,69,69	0
7	ACT	D	387	4/4	0.80	0.14	41,42,42,42	0
7	ACT	C	138	4/4	0.85	0.12	32,32,32,32	0
7	ACT	F	389	4/4	0.90	0.10	41,41,41,42	0
4	NA	B	375	1/1	0.93	0.05	31,31,31,31	0
4	NA	A	374	1/1	0.97	0.03	25,25,25,25	0
5	HEC	A	500	43/43	0.97	0.07	22,24,26,26	0
5	HEC	B	500	43/43	0.97	0.07	21,23,24,25	0
4	NA	A	375	1/1	0.97	0.04	30,30,30,30	0
4	NA	B	374	1/1	0.98	0.04	32,32,32,32	0
5	HEC	B	600	43/43	0.98	0.07	14,16,19,21	0
6	CA	A	400	1/1	0.98	0.02	20,20,20,20	0
5	HEC	A	600	43/43	0.98	0.06	16,18,21,22	0
6	CA	B	400	1/1	1.00	0.02	17,17,17,17	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.
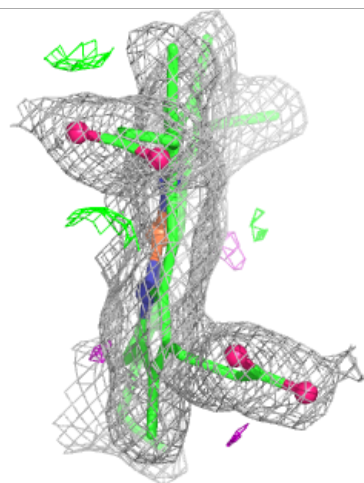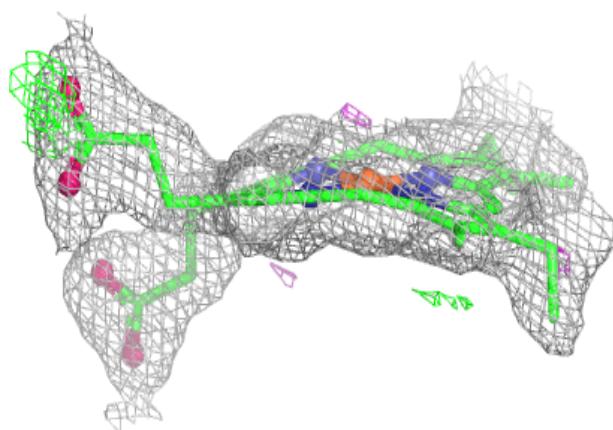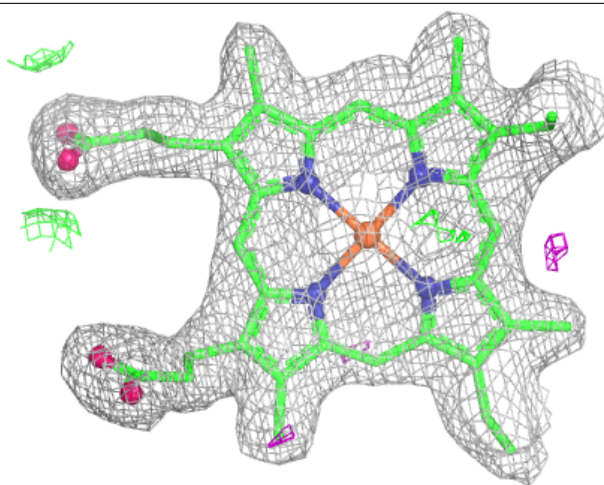
Electron density around PG6 F 388:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
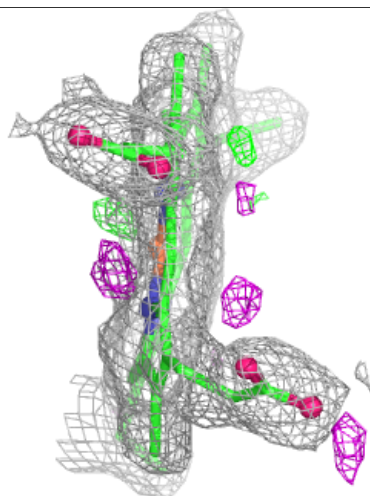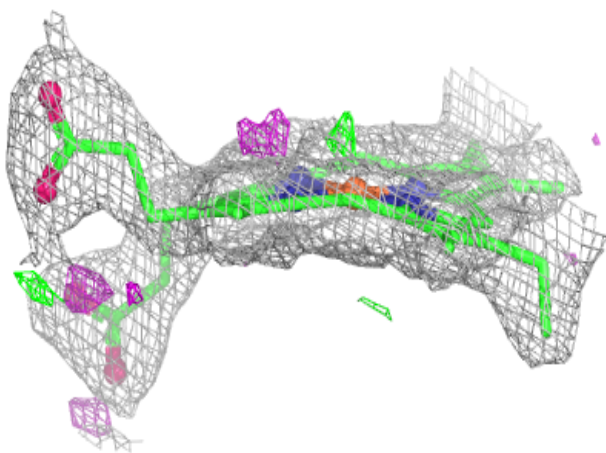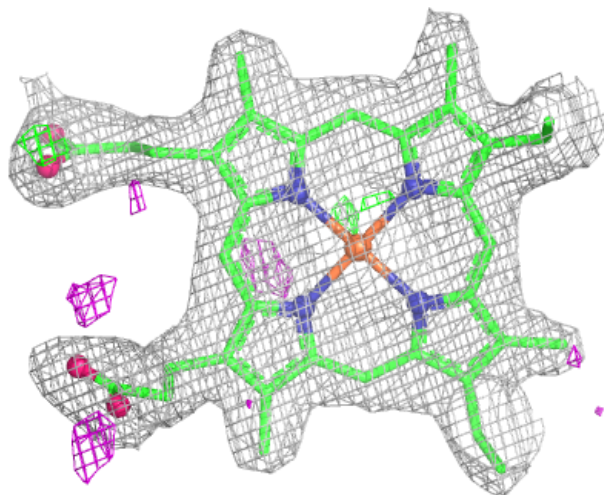and green (positive)
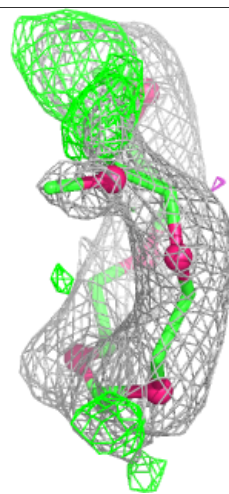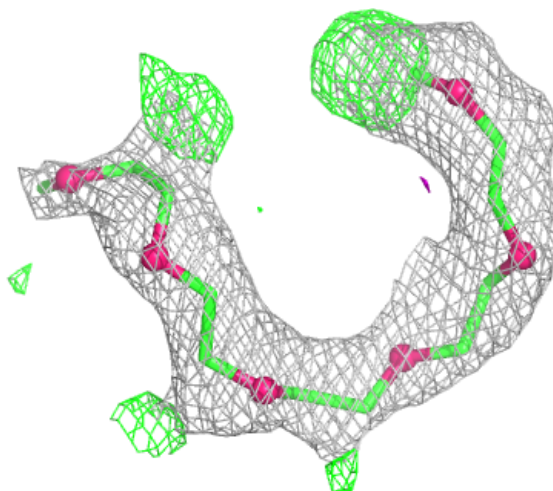
Electron density around HEC A 500:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
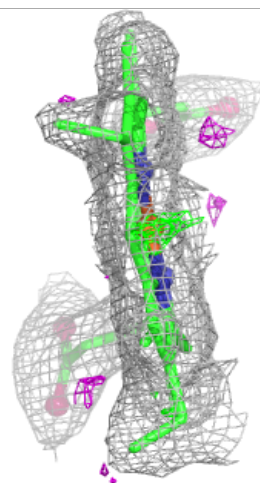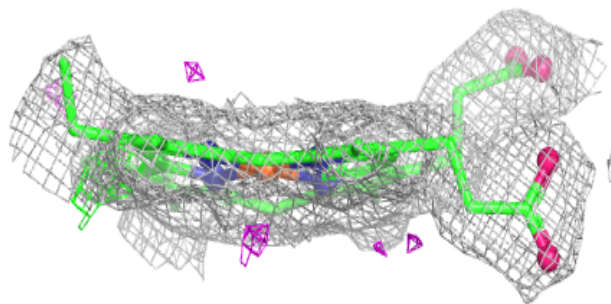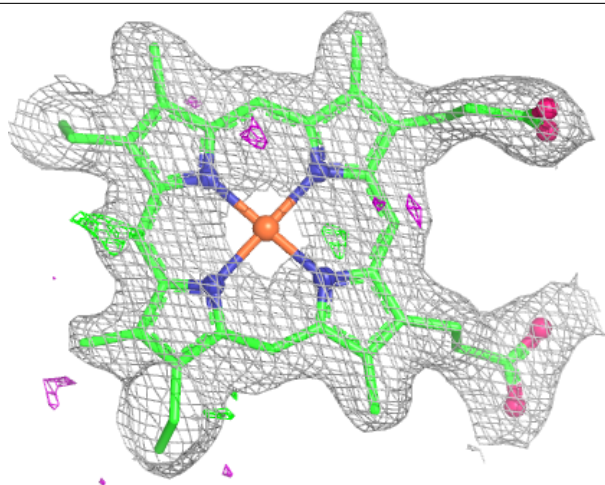and green (positive)

Electron density around HEC B 500:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

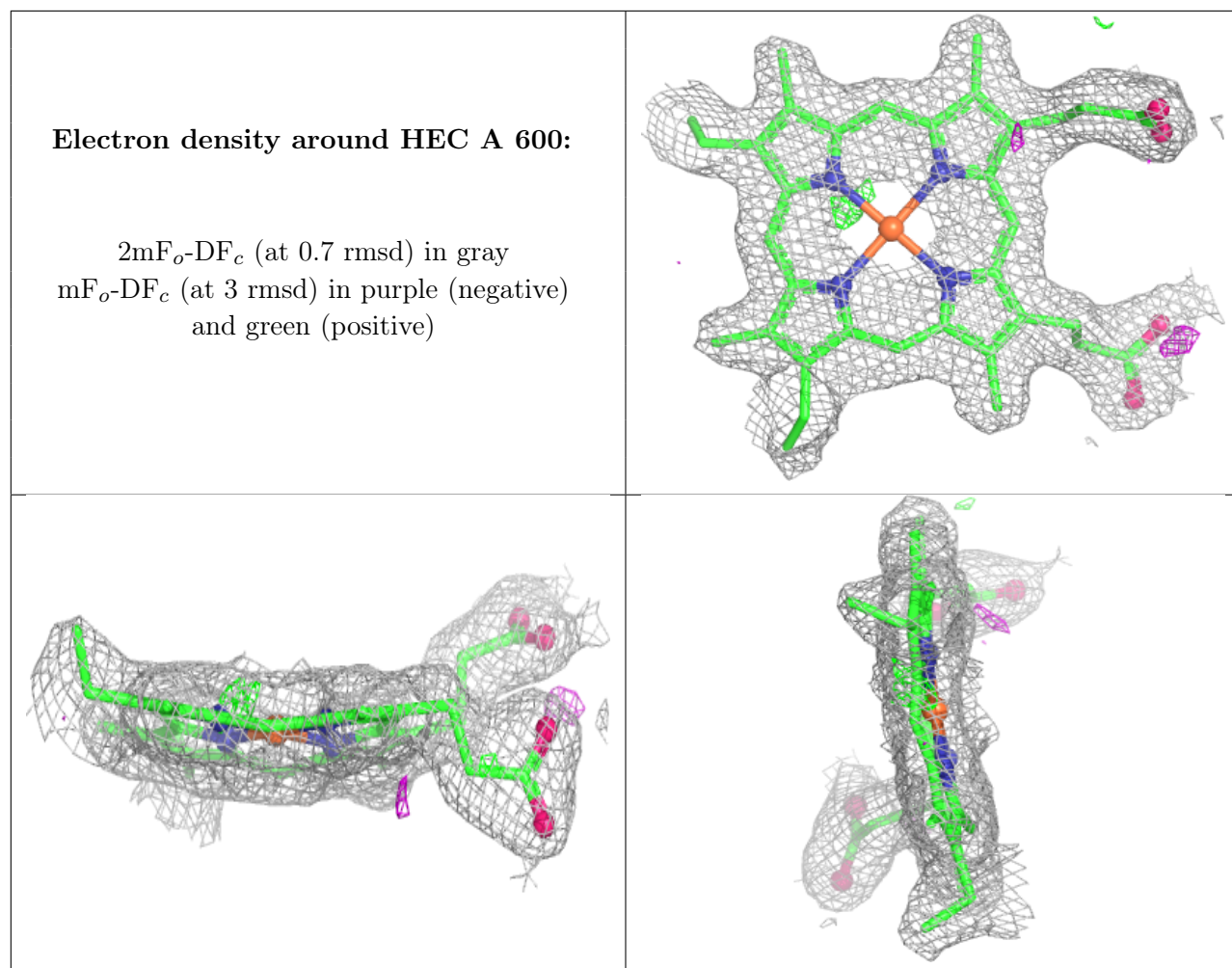**Electron density around HEC B 600:**

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around HEC A 600:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

6.5 Other polymers (i)

There are no such residues in this entry.